

REMARKS

The abstract and specification have been amended in order to correct grammatical, spelling and idiomatic errors contained therein. No new matter has been added.

In order to more particularly point out and distinctly claim the subject matter which Applicant regards as the invention, Claims 1 and 2 have been amended to recite that the chlorinating agent is t-butylhypochlorite. Accordingly, Claim 3 has been canceled. Additionally, Claim 5 has been amended in order to address the Examiner's rejection under 35 USC 112. That is, Claim 5 now recites the process as defined in Claim 1. No new matter has been added.

Claims 1 and 2 have been rejected under 35 USC 102(b) as being anticipated by Grella et al. Claims 1, 2 and 5 have been rejected under 35 USC 102(b) as being anticipated by Chankvetadze et al. Claims 1-4 have been rejected under 35 USC 103(a) as being unpatentable over Grella et al in view of Metzger. Applicant respectfully traverses these grounds of rejection and urges reconsideration in light of the following comments.

The presently claimed invention is directed to a process for preparing 3-chloro-5-nitrotoluene which comprises the steps of reacting 2-methyl-4-nitroaniline with t-butylhypochlorite in a neutral condition to obtain 2-chloro-4-nitro-6-methylaniline and deaminating a reactant mixture containing the 2-chloro-4-nitro-6-methylaniline to obtain 3-chloro-5-nitrotoluene.

As discussed in the present specification, the presently claimed invention overcomes the problems of the prior art in that it enables the production of 3-chloro-5-nitrotoluene and the subsequent preparation of 3-chloro-5-methylphenylisocyanate in a large amount without any subsequent purification being needed and allows the preparation of 3-chloro-5-nitrotoluene under mild conditions, without any strong acid or strong base being necessary. It is

respectfully submitted that the prior art cited by the Examiner does not disclose the presently claimed invention.

The Grella et al reference discloses the preparation of 3-chloro-5-nitrotoluene comprising the steps of reacting 4-methyl-2-nitroaniline with N-chlorosuccinimide in the presence of acetonitrile to produce 2-chloro-4-methyl-6-nitroaniline and adding concentrated sulfuric acid and sodium nitrite to the 2-chloro-4-methyl-6-nitroaniline to produce 3-chloro-5-nitrotoluene. As admitted by the Examiner, this reference does not teach the use of t-butylhypochlorite as the chlorinating agent or maintaining the reaction mixture at a temperature of from 40°C to 50°C during the deamination step.

The Chankvetadze et al reference discloses the synthesis of 3-chloro-5-methylphenylisocyanate which comprises the steps of reacting 4-nitro-6-methylaniline with potassium perchlorate as a chlorinating agent to prepare 2-chloro-4-nitro-6-methylaniline, the reaction of sodium nitrite and sulfuric acid with the 2-chloro-4-nitro-6-methylaniline to form 3-chloro-5-nitrotoluene, the reaction of stannic chloride and hydrochloric acid with the 3-chloro-5-nitrotoluene to form 3-chloro-5-methylaniline and the reaction of triphosphene and hydrochloric acid with the 3-chloro-5-methylaniline to form 3-chloro-5-methylphenylisocyanate. However, like the previously discussed reference, this reference does not disclose the use of t-butylhypochlorite as a chlorinating agent or maintaining the reaction mixture at a temperature from 40°C to 50°C during deamination step.

The secondary reference, Metzger et al, has been cited by the Examiner as showing the equivalence of N-chlorosuccinimide with t-butylhypochlorite. With respect to the claimed condition of maintaining the reaction mixture at a temperature of from 40-50°C during the deamination process, the Examiner states that the Grella et al reference indicates that after the addition of sodium nitrite to the reaction mixture, the deamination is conducted between zero and room temperature and then the mixture is refluxed. The Examiner further states

that it is possible during the deamination process of Grella et al that the reaction mixture has been allowed to have a temperature variation from 40°C to 50°C. However, Applicant respectfully submits that Grella et al does not properly combine with Metzger et al in a manner that teaches the presently claimed invention.

The Metzger et al reference discloses a process for preparing a chlorinated diisocyanate. This reference states in Column 2, lines 43-50, that it is essential to the process disclosed there that 2,4- and/or 2,6-toluenediamine be reacted with N-chlorosuccinimide, t-butylhypochlorite or the like in order to obtain the new compositions of that reference. There is no showing in this reference that N-chlorosuccinimide and t-butylhypochlorite are equivalent as chlorinating agents with any other compounds other than 2,4- and/or 2,6-toluenediamine. Therefore, Applicant respectfully submits that the Metzger et al reference does not suggest the use of the chlorinating agents disclosed there in the process of Grella et al.

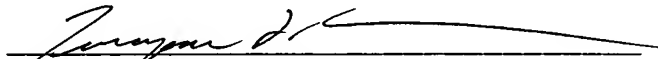
With respect to the claimed temperature range, the Grella et al reference has no disclosure regarding the temperature being maintained at from 40°C to 50°C during the deamination step. As the Examiner is aware, the mere possibility that there may be temperature variations of from 40°C to 50°C during the Grella et al deamination process does not suggest the presently claimed temperature range. Applicants respectfully submit that only hindsight gained by the benefit of the present disclosure is enabling the Examiner to extract the claimed temperature range from Grella et al. As such, Applicants respectfully submit that the references cited by the Examiner do not even present a showing of prima facie obviousness under 35 USC 103 with respect to the presently claimed invention.

Although, as stated above, it is felt that the references cited by the Examiner do not present a showing of prima facie obviousness under 35 USC 103, objective evidence is of record which more than establishes the unobviousness of the presently

claimed invention. Example 1 on pages 5 and 6 of the present specification show that the presently claimed process produced 2-chloro-4-nitro-6-methylaniline at a production yield of 80%. Example 1 on pages 6 and 7 of the present specification also disclose the production of 2-chloro-4-nitro-6-methylaniline according to the presently claimed process at a production yield of 90%. In contrast thereto, the Grella et al reference shows the production of 2-chloro-4-methyl-6-nitroaniline at a production yield of 29% after purification by chromatography. Grella et al also discloses the production of 3-chloro-5-nitrotoluene at a production yield of 69% after purification by chromatography. As shown by the Examples contained in the present specification, the present invention results in an unexpected improvement in high production yield of the product. No further purification is needed in the present invention and, as such, it is respectfully submitted that the presently claimed invention clearly is patentably distinguishable over the prior art cited by the Examiner.

Reconsideration of the present application and the passing of it to issue is respectfully solicited.

Respectfully submitted,

  
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Encl: Marked-Up Substitute Specification  
Clean Substitute Specification  
Replacement Abstract  
Postal Card

136.05/04